The Approach

U. S. NAVAL *Aviation Safety* REVIEW

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JULY 1955

In This Issue . . .

Maintenance—key to safer flight

THIS, the first issue of *The Approach*, warrants a brief introduction.

In developing this new voice of naval aviation safety, the principal consideration was you, the reader.

Knowing that any successful aviation safety program must possess continuity of purpose, and clearness and simplicity in presentation, the format of *The Approach* was designed to include the three major areas of aircraft accident prevention: Flight Operations, Aviation Medicine and Maintenance. The major theme of each month's issue will be the aircraft accident prevention subject outlined in the Aviation Safety Planning Guide.

Safety in naval aviation is a large and complex problem to which no single answer may be applied, but which requires many solutions, or *approaches* to that problem.

To provide you, the pilot, the aircrewman and ground maintenance personnel with positive, continuing Navy-wide approaches to your individual problems is our purpose.

With this in mind a survey was made within the staff of the Naval Aviation Safety Center to obtain a keynote expression of the purpose of the new magazine. In proposing *The Approach* as best identifying the Naval Aviation Safety Review as the voice of naval aviation safety we remind you that the magazine is only as good as you, the reader make it.

For that reason, if you like our selection let us know your approval. If you have a better suggestion we welcome the submission of your ideas, names and titles which might better express that identity.

This is your magazine, and we urge your assistance in making it the approach to positive safety in naval aviation.

Tech

The Approach

U. S. Naval Aviation Safety Review

(formerly the U. S. Naval Aviation Safety BULLETIN)

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The printing of this publication has been approved by the Director of the Bureau of the Budget, 9 Dec 1954. This periodical contains the most accurate information currently available for aviation accident prevention. Contents should not be construed as regulations, orders or directives unless so stated. Material extracted from Aircraft Accident Reports, OpNav Form 3750-1 and Anymouse (anonymous) Reports may not be construed as incriminating under Art. 31, UCMJ. Names used in accident stories are fictitious unless stated otherwise. Photo Credit: Official Navy or as credited. Original articles may be reprinted with permission. Contributions are welcome as are comments and criticisms. Address all correspondence to Director, U. S. Naval Aviation Safety Center, NAS Norfolk, Va.

FOREWORD

THE DEPUTY CHIEF OF NAVAL OPERATIONS (AIR)
WASHINGTON

It is with a great deal of pleasure that I address you through the medium of the first issue of the NAVAL AVIATION SAFETY REVIEW.

Naval Aviation has progressed very rapidly during the past few years. To realize maximum effectiveness and combat readiness it has been necessary to place strong emphasis on our aviation accident prevention program. The excellent progress which has been made during the past year is most gratifying and has resulted in the saving of lives and the conservation of extremely costly equipment.

The NAVAL AVIATION SAFETY REVIEW will provide a medium through which all of us can benefit from the experiences of others. By bringing to light the mistakes as well as the accomplishments of others who fly, we can reduce the number of instances in which pilots must learn the "hard way".

The accident prevention program is an all hands evolution, and this publication is intended for the use of all who may contribute to the safety of our flight operations. We must all, individually and collectively, contribute to the aviation safety program by hard work in our own particular specialty. By submitting ideas, articles, experiences and photographs pertinent to the problems that we encounter for publication in this magazine, we can make a special contribution which will help to keep the accident rate on its present downward trend.

Thos. S. Combs

THOS. S. COMBS

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ON THE COVER . . . .

Ready to go! This familiar picture shows the final step in what is perhaps the most complex operation in aviation. The tremendous importance of the many preliminary activities which make this picture possible, whenever and wherever the need arises, is perhaps best expressed in one word—Maintenance. This issue of *The Approach* emphasizes various aspects of this secret of the effective teamwork of naval aviation.

Straight from the horse's mouth comes the article on page 8 of this issue by Test Pilot Harry T. Brackett on "Landing the Cutlass."

Flight Operations

Complete yellow sheet entries by pilots helps maintenance insure safer flights.

Push that Pencil!

INTERESTED in a paid-up insurance policy — with the kind of coverage that protects you against a large percentage of flying accidents? Step right into the line shack, sir, one is waiting for you, for free, every time you sign out an aircraft. That's right, we mean the ever-present but frequently ignored yellow sheet, OpNav Form 3760-2 (7-53), formerly NavAer 2700.

Unless you are an exceptionally observant pilot, chances are you have signed hundreds of these yellow sheets, still unaware of the information to be gained, or to be recorded by you on the sheet. Think not? Then suppose you test yourself with a short quiz.

Five Right Is Par

Here are eight questions; five correct answers is considered par for the course; six correct answers is "excellent," and, should you get them all right, brother you're maintenance officer material!

1. What is the exact title of the yellow sheet form?
2. Are there any provisions for listing of passengers other than the pilot?
3. Which part(s) does the pilot take on non-local flights?
4. Which part(s) does the pilot use for maintenance away from home?
5. Are there provisions for logging:
   a. Combat power engine time?
   b. Afterburner engine time?
   c. Oxygen consumption?
   d. Auto-pilot time?
   e. Rotor time?
   f. Clutch engagements?
   g. Catapult takeoffs?
6. Are flyable gripes logged any differently from those discrepancies which ground the aircraft?
7. Is the pilot required to indicate having read the discrepancy report for the previous flight?
8. How are night carrier qualification landings logged in the Part D Crew Data spaces provided?

Bet You Learned Something

Now check your answers against the instructions contained in a yellow sheet form. Regardless of the mark you made, it is believed that a closer scrutiny of the sheet will reveal at least one or two

Checking yellow sheets before flights is prevention that pays off.

For better maintenance, enter thorough reports after each flight.

items of which you may not have been aware.

Even more important to you, the pilot, is the fact that this single form offers an impressive amount of information concerning the status of the aircraft. It also provides an excellent opportunity to accomplish the additional purpose of assisting maintenance personnel in their pursuit of trouble analysis in preventing accidents.

A critical and continuing problem of maintenance-engineering officers concerns the lack of, indeed, often complete absence of adequate information relating to gripes noted by pilots. Specific details, descriptions which would greatly assist trouble-shooting personnel to locate and correct discrepancies are often lacking. Vague, brief scrawls ranging from "brakes no darn good," to the classical: "right-wing-heavy, left-wing-heavy—both-wings-heavy" type of comment are being recorded with discouraging repetition.

Good Squawks Help

A survey of line crews will reveal that the highest respect is held for the pilot who carefully notes and deliberately describes all of the discrepancies rather than the pilot who consistently pencils an "OK" on the yellow sheet regardless of the true status of the aircraft.

Obviously, a large number of in-flight discrepancies cannot properly be discovered by a ground check, and consequently it is the responsibility of the pilot to furnish the additional description necessary. Pilots are urged to increase the practice of personal discussion of discrepancies with maintenance personnel to eliminate this problem. The more often this is done, the less frequent will be the unsatisfactory maintenance write-off comment: "Checked OK on ground."

Only a brief tour with the maintenance engineering department is required to convince any pilot that the recording of even the most unimportant squawk can be of invaluable assistance to maintenance personnel in correcting a potentially serious discrepancy with a proportionate saving in material, man-hours and lives.

Too, it should be remembered that the yellow sheet sometimes comprises the only history of an aircraft which has crashed under unknown circumstances. With this record, statements of witnesses and other indirect information, investigators are sometimes able to focus suspicion upon a particular cause source which might otherwise remain undetected.

Log officers and their assistants are faced with a constant and often discouraging problem of recording accurately and properly in pilots' flight log books the various categories of flight time. Improper recording of this time on the yellow sheet presents a tedious chore of rechecking and correcting which is easily prevented by cooperation on the pilot's part.

Perhaps no other phase of aviation so aptly illustrates the appropriateness of the old saw: "An ounce of prevention . . ."

To the pilot, then: develop the saving grace of recording your information for the next pilot—he might be you! ●

Safety Council Notes

The following notes have been selected from recent world-wide Aviation Safety Council reports.

FLEET AIR GUAM—Beech Brakes. As a result of brake discrepancies reported by pilots on an SNB, FASRon 118 recently discovered that lack of periodic inspection of the master brake cylinder has permitted excessive corrosion and failure of rubber cup seal to go unnoticed, until finally, complete failure of brakes was experienced. It was recommended that particular attention and a thorough inspection be given the master cylinder when pilots report faulty operation of the brakes.

CNABATRA—Nearing the Goal. The major accident rate of this command is meeting the all-Navy goal of "3.5 in '55" with a rate of 3.13 at the end of the third quarter. A notable record was achieved by the aircraft maintenance departments of this command when 50,000 hours were flown without a single accident due to engine or material failure. This is considered outstanding in the light of mounting maintenance work required by the aging SNJ. For the first time in nearly two years there were no stall/spin type accidents in this quarter.

SAN DIEGO AREA—Safety Awards. VADM H. M. Martin presented letters of congratulations to commanders of those squadrons winning the quarterly safety awards and to those which achieved an accident-free quarter. Included in the squadrons enjoying a perfect safety score of 100 for the quarter ending 31 December 1954 are five VF Jet; two VF-VA Prop; three VS; 15 VP; five VU/Training Units; two HU-HS and six Fasrons.

COMFAIRALAMEDA, COMNAB 12 ND—Cost Conscious. This command is increasing its accident prevention effort by acquainting the pilots with the overall cost problem through dissemination of accident cost per hour figures and by emphasizing the importance of the role maintenance plays in the safety program.

NAATC—Qualified Lookouts. In discussing CNATra Instruction 3750.18 concerning simulated instrument flights in cabin type aircraft, all commands were told that during cross-country flights in this type aircraft a qualified lookout must accompany if simulated instrument training is contemplated.

HELICOPTER ACCIDENT COMMITTEE, PAC—Maintenance. The report of a recent accident in a Marine helicopter squadron revealed that, while removing the wheel and tire from a helicopter the tire exploded, injuring several personnel. All maintenance officers and safety officers were reminded to review T.O. 52–50, which informs personnel to deflate tire before removing wheel from the aircraft.

FLOGWINGPAC—Repeat Performance. In its "Summary of Accidents for the quarter ending 31 March 1955," the command noted that its units flew a total of 18,121 hours without an accident of any kind. Even more impressive is this report when reference is made to FlogWingPac's report of the previous quarter during which 17,846 hours were flown, again without a single accident. This gives a very grand total of 35,967 accident-free hours for which *The Approach* offers a special citation for its excellent repeat performance of the Golden Goose Egg! Those squadrons which contributed to this outstanding record of aviation safety, with respective hours flown during the past quarter are: VR-2, 1714 hours; VR-5, 4145; VR-21, 3157; VR-23, 2379; VMR-152, 4460 and VMR-352, 2260.

COMFLOGWINGLANT/CONT—TV Tip. Following a recent, maintenance-caused wheels-up landing in this command it was recommended that future efforts be made to insure all squadron maintenance work be thoroughly checked by well qualified personnel. Also revealed in this accident were the latent possibilities of dual cockpit configurations when rear seat occupants are unfamiliar with the circuit breaker system of the TV airplane.

SAN DIEGO AREA—Lost Weekend. Chief of Staff, ComAirPac in a discussion of recent cross-country accidents and flight violations pointed out the following factors which lead to trouble: (*a.*) Intemperance on part of pilots away for a weekend. (*b.*) Pressure to return aircraft on time. (*c.*) Flying into poor weather conditions. (*d.*) Failure to take proper equipment. Major factors affecting safety are pilot reaction time, and the physiological and psychological fitness. COs were urged to devote additional attention to athletic and conditioning programs.

HELICOPTER ACCIDENT COMMITTEE, PAC—Corrosion. In a discussion on corrosion control it was determined that the best method of combating corrosion in helicopters is to wash the aircraft thoroughly with plenty of fresh water immediately on return from any flight which exposed the plane to salt water spray. Where persons have been hoisted out of water into the cabin the salt water in the cabin should be flushed out with fresh water.

NATEC (LAKEHURST)—'Check-off Check.' This command noted the recommendation contained in CNATECHTRACOM Aviation Safety Council quarterly report to the effect that tower operators use the phrase "If checkoff list is complete, you are cleared for takeoff!" This phrase will be inserted in local tower procedure later.

SAN DIEGO AREA—Maintenance and Material Group. There is an apparent lack of understanding of some aspects of the Failure Unsatisfactory Report system. ComAirPac will study the problem and make a presentation at the next meeting. (Editor's Note: An article dealing with the new FUR system is in preparation).

"Landing the CUTLASS" is the fourth in a series discussing the landing techniques of naval aircraft. Harry T. Brackett, a Chance Vought test pilot since 1951, reports on the Cutlass this month. A designated naval aviator, Pilot Brackett served in the Fleet during World War II and with VX-3 thereafter.

The test pilot talks on

landing the 'CUTLASS'

WITH the advent of present day jet-powered aircraft, the question of proper landing technique has been posed time and time again.

For the benefit of those pilots who are not familiar with the *Cutlass*, I would like to cover a few of the engine and trim characteristics of the airplane, particularly those affecting the landing phase of a flight.

The dual surfaces attached to each fin are the rudders and combination yaw damper and directional trimmers (sometimes called auxiliary rudders). These directional trimmers function as a part of the stabilization system (yaw damping), and also as rudder trim devices.

For lateral and longitudinal trim, two ailavator trim potentiometers, one for aileron (roll) and one for elevator (nose-up, nose-down) trimming, are located on the control stick grip. This trim system will be new to most of you, and I believe you will find it far superior to the old "beep" system.

Actuating either or both of the trim wheels adjusts the ailavators to a new zero stick force setting, rather than trim tabs as are used on other airplanes currently flying. It is quite easy to trim to zero stick force by using smooth movements of each wheel.

Engine controls and characteristics of the J-46 engine are so different from the engines you have been accustomed to, that a brief description should be in order, especially before discussing landing procedures. The majority of all flying will be accomplished at 100% rpm since this engine will develop full rpm at approximately the half-throttle position, with only 20% of the basic thrust (approximately 800 pounds per engine) being developed.

Advancing the throttle beyond the mid-position decreases the tailpipe area, by adjusting the variable area nozzle, and increases the engine fuel flow. This in turn increases the TOT, (turbine outlet temperature) until maximum TOT is reached at the full throttle position (on a standard day). In addition, each engine incorporates an ATC (automatic temperature control) "black box," which senses compressor inlet temperature and, in turn, automatically adjusts the tailpipe area and TOT for non-standard conditions. This enables the engine to develop full thrust at all times, regardless of ambient temperature.

One can readily see the advantages of such an engine control, one important aspect

"As the last part of the approach is effected, I open the speed brakes about one-quarter . . ."

being that TOT adjusts to limit allowable automatically throughout a climb to altitude, as compared to the TOT drop experienced on most constant tailpipe area jet engines. Maximum TOT is available when the throttle is in either the military or afterburner position. The use of afterburners will give an increase in thrust of about 50% over that available in military.

Now that we have become familiar with a few of the features peculiar to the F7U-3, I would like to cover in detail the type of landing technique I would recommend for land-based operations. Even though I am an ex-Navy pilot, I have long ago given up the practice of flying a carrier pattern when landing ashore. There simply is no need to make a low, dragged-in approach. I have had many opportunities to observe the Weekend Warriors flying F9F-7s here at Navy Hensley. Some of the approaches I've seen leave me shuddering and I'm certainly not getting that ancient.

Rather than using an almost full-power approach, I prefer to use partial-power from the instant at break until over the fence, and this will hold true for any airplane—the F7U-3 is not unique in that a special technique must be used. Frankly, the *Cutlass* couldn't be better adapted to a partial-power approach, since the engines operate at 100% rpm throughout the power range recommended to be used in a field landing.

Thus, if necessary, a wave-off can be accomplished exceptionally well using military thrust, and if things really get tight, the afterburners are available to really give you a boost in a go-around. However, suppose we approach this problem from the air, and follow a typical pattern that I attempt to follow on all my landings.

I usually enter the pattern at an airspeed varying from 250 to 300 knots and at an altitude of 1000 feet over the ground. Both engines are operating at 100% rpm and about 520-540° TOT. Thrust and/or speed brakes can be adjusted as desired to maintain the above airspeed. The break can be effected as desired—I usually vary from a sharp 90-degree break to a gentle 45-degree bank, just depending on how I feel that particular day. Usually, I'm rather conservative and take the long way in.

After breaking, I extend the speed brakes about half-way in order to decrease airspeed to 210 knots. At this speed, the gear handle is placed in the DOWN detent. A nose-

The test pilot talks on landing the *Cutlass*
(Continued)

down trim change will be exhibited, requiring approximately 12 degrees nose-up trim to counteract. The transition from the clean to the landing configuration can be accomplished with little or no stick force change, if the elevator trim is rolled in as the gear extends.

Since the landing gear is mechanically rigged to the slat actuating switch, the slats and gear extend together, the slats usually preceding the gear. The gear and slats are checked visually using the rearview mirrors and observing the indicators and hydraulic pressure.

The slat extend switch is also checked to insure that it is in its proper position. This is especially important since the slats must be extended to land the airplane normally.

With the slats retracted, gear up or down, loss of control—as evidenced by a sharp yaw slice—is exhibited at airspeeds below about 130 knots.

When abeam of the duty runway, airspeed has been decreased to 140 knots and altitude has dropped to about 500 feet above the ground. This has been accomplished by pulling in speed brakes and easing back on the control stick.

I still use the 180-degree type carrier approach pattern; however, my starting altitude abeam is increased 300 to 400 feet. Otherwise, my approach differs little from a typical Navy approach. The nose of the airplane continues to come up throughout the approach, with airspeed decreasing smoothly to 130-135 knots on the cross-leg.

Trim setting at this point is usually about 15 degrees nose-up. This setting still requires about 6-10 pounds pull force on the stick, which I prefer. I never did like to have a zero stick force flying up the groove. I have no real feel of any airplane if such is the case. The 12-15 degree bank angle is maintained, and an airspeed of about 120-125 knots held entering the groove. This will require an increase in thrust comparable to about a 600° TOT setting in order to

hold a sink speed of 5-8 feet-per-second. (300 to 500 fpm). In the last part of the approach I open the speed brakes about one-quarter, which requires more thrust to hold a comfortable rate-of-sink.

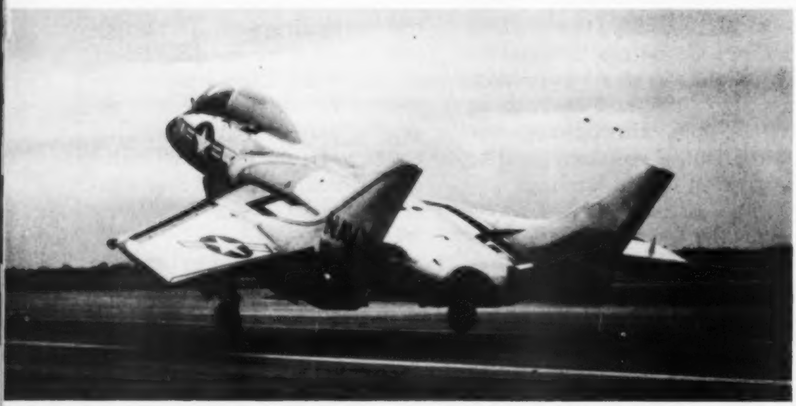
When over the fence or boundary, and I see that I have it made, I begin to ease power and initiate a flare, so that by the time I have passed over the end of the runway, I have essentially cut the power to idle and have pulled the nose up slightly over that which was required to hold 120 knots. Touchdown is usually accomplished at about 110 knots.

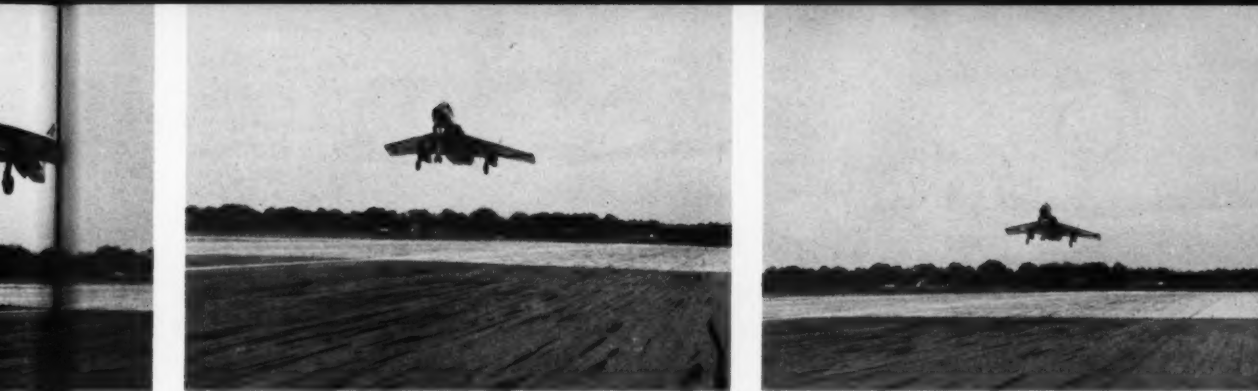
Speed brakes are fully deflected and the nosewheel held off the ground for the major part of the ground roll. There is no reason to drop the nose gear until airspeed/groundspeed has decreased to about 80 knots. Holding the nose up acts as a very effective deceleron.

The brakes installed in the F7U-3 are more than adequate for their purpose, and the airplane can be slowed to a stop very easily by using short applications of brake.

Just like any other airplane, but particularly so with the F7U-3 since it is somewhat heavier than the average present day fighter, the brakes

Touchdown is usually at about 110 knots.





Fly a smooth, comfortable approach ... above all, don't drag it in a half-mile up the final.

should not be tromped in and held. After enough heat has been generated, the brakes and wheels will subsequently freeze and lock. This, of course, gives you a pretty rough ride if your groundspeed was a little on the high side. Just remember to use the brakes sparingly and you will find them to be more than adequate to decelerate the airplane.

Everything is on the pilot's side when the above technique is used, since the medium-high power settings utilized during the approach enables one to take a waveoff at any point in the pattern.

In case of an engine failure during the approach, the landing can be easily completed by merely adding power on the good engine. As you can see, TOT can be increased from 521/600° to a limit of about 680° in military or in afterburner. If a landing is not considered to be in order when an engine is lost, then a go-around can be effected by advancing the throttle to the afterburner position.

A respectable rate-of-climb is available on single engine with afterburner, even with the gear down.

As I see it, the only time I could get into trouble using the procedure described above, would be that one-in-a-million time when both engines flamed out after reaching the abeam position. But, as many other pilots have stated before, and I certainly concur, it isn't likely that such a condition will occur if the engines have been operating satisfactorily throughout the flight.

I heartily recommend the above procedure and technique to be used in landing the F7U-3 *Cutlass*. Other than the power settings given, this technique is directly applicable to any jet aircraft now in service with the Navy.

The *Cutlass* has excellent stall characteristics in the landing configuration. Actually, the airplane reaches a minimum speed after which only a mild porpoising action is evidenced. Even though the attitude may seem rather nose-high in the landing approach, if the recommended speeds are used, the airplane can be greased on the main gear and the nose held up throughout most of the roll-out.

Field carrier landings are a different matter; however, it is realized that several flights will be accomplished in the airplane prior to flying the paddles. By that time, each of you will have established your individual technique, and will, of course, be aware of the characteristics of the airplane. FCLPs are a lot of fun to fly, and this airplane handles very well while doing them, but this type flying is the exception rather than the rule.

Be smart and fly a smooth, comfortable approach. Don't wrap up in a turn, and above all, don't drag the airplane in a half-mile up the groove. This isn't even good carrier approach technique, so why use it around a field where you can really get into trouble.

The safe way is the easy way, and don't let anyone tell you otherwise. ●

Previous articles in this series, discussing the landing of the Banshee, Cougar, and Fury, appeared in the April, May and June issues respectively, of the U.S. Naval Aviation Safety Bulletin, predecessor to this magazine. Other articles of this nature will follow as available. Comment and suggestions are invited.

ANYMOUSE

Read that Yellow Sheet

ANYMOUSE took off on his first night hop in an F9F-6 and when airborne rolled into a turn to the right to avoid an inhabited area. He then commenced his climb schedule and upon reaching 13,000 feet decided to make a turn to the left to calibrate his turn-and-bank indicator.

"Upon recovery from the turn to the left I experienced considerable difficulty in raising the left wing" said Anymouse. "There was considerable delayed action before the controls would react. I turned back toward the field and started a slow descending spiral letting down into the traffic circle.

"The spiral was made to the left and the left wing tended to roll to the left. By rough action with the stick the wing could be picked up. When at the 180-degree position at 5000 feet I started my approach by putting my wheels down at 200 knots and my flaps down at 170 knots.

"I planned a high straight-in approach so that if I lost complete flaperette control I would either be high enough in my turn to eject or be on my straightaway and control my wings with the rudders.

"My approach was crowded and I was unable to dissipate my speed and altitude. Rather than take a waveoff I landed the plane hot and blew the port tire on touchdown at approximately 170 knots. I was able to keep the plane on the runway and stop without using the arresting wire."

In analyzing this incident the following errors were pointed out by Anymouse:

1. Failing to read the past history on the plane when signing the *yellow sheet*. This plane had recently been downed for a sticking flaperon-valve.
2. Making a left-hand approach rather than a right-hand approach. The plane was easy to control in a right turn.

Preflight Pays

"Prior to a training flight I was preflighting the PBM-5 which was secured to a buoy when I noticed the bombardier's window did not have a metal cover plate installed. While having this installed I found the armor plate for the bow turret resting against the glass. I had this removed and installed the cover plate.

"The plane had flown a morning flight with the cover stowed on the galley bulkhead and with armor plate rattling against the glass window. This could have been disastrous.

"Pilots must preflight planes thoroughly even though the plane captain says 'she's ready.'"

Small Red Flag

Anymouse in an AD-4L was cleared to return to Jacksonville from a cross-country flight to Key West which involved a night takeoff. There were buildups and thunderstorms along the east coast of Florida and inland but the west coast destination was VFR.

The section leader completed his engine runup and taxied out on the duty runway and took off. Anymouse, not to be left too far behind, rushed through his runup and followed.

Anymouse said, "There was no moon out that night and I was unprepared for the sudden transition from taking off by reference to the runway

and his hairy tales

lights to flying in the pitch darkness after becoming airborne.

"The takeoff course was to the south, into complete blackness off the end of the runway. I shifted my gaze to my instruments only to be greeted by the red CAGED flag of my gyro horizon. I had commenced a right turn before passing over the water and continued around until the lights of Key West gave me a visual reference to continue my climbout.

"I wanted to gain more altitude before leveling off" stated Anymouse, "and I did not uncage my gyro in a climbing attitude. I had about 500 feet of altitude at this time. At 1500 to 1800 feet I entered a cloud which I had not seen because of the darkness of the night. The tower people were not aware of its presence either.

"I continued my climb on partial panel hoping to break out. At about 3000 feet I suddenly noticed my altimeter starting to unwind very rapidly. My first impulse was to haul back on the stick, but I forced myself to check my needle-ball and saw the needle laying over in the corner.

"Using the technique which had been drummed into me in basic instruments, 'level wings, then stick back,' I effected recovery at about 1500 feet and shortly thereafter broke clear. I steadied up the plane, uncaged my gyro and joined with my section leader.

"I found out after we landed that the section leader had been playing touch-and-go with the cloud hanging over the field for the same reason that I had. Namely it was impossible to see it until you had entered it and saw your lights loom up."

At the time of this incident Anymouse had a total of 490 hours with about half in Able Dog aircraft. He also had a valid White Card issued by NSAWF.

Anymouse's opinion? "Never rush yourself."

Tool Sin

"I took off in my HUP from the deck of a carrier to assume plane guard position. Immediately upon becoming airborne my cyclic stick stuck in the full left position. As I was attempting to turn 90 degrees to the right into the wind (I was still broadside to the wind) I was blown sideways off of the port bow.

"By manual strength alone I was able to keep the helicopter from rolling over but I found it impossible to right the plane completely or to turn to the right. I let the plane carry me around in a 360-degree turn which put me abeam of the island. I added RPM and skidded the helicopter over the spotted aircraft on deck to just ahead of the forward elevator where I immediately set the plane down.

"Upon inspecting the helicopter it was found that a screwdriver had become lodged in the control cables under the floorboards, aft of the pilot. Since the screwdriver was identified as one which did not belong to my crew it was obvious that it had to belong to the maintenance personnel from either the ship or the airgroup. Five days previously they had helped to solve some electrical difficulties.

"In the HUP type helicopter the floorboards are approximately two inches from being flush with the bulkheads on both sides of the plane. Therefore, it is recommended that after all interior work requiring the use of loose tools or gear, all such loose gear be accounted for and an *inspection* be made under the floorboards for loose articles. ●

Primer for Pilots—No. 3

Before you spur your swept-winged steed into the blue with only a shadowy notion of the various aerodynamic regions you plan to explore, take a look at the potential dangers of going . . . .

MOST any member of the Navy family, be he barnacled blackshoe or afterburning flyboy, can look at a marine pilotage chart and extract certain fundamental information therefrom.

For example, in the simplified chart here (*Fig. 1*), if you're told you're on a seagoing boat and some character tells you to drive the boat to lat. 30°-00; long. 80°-00, you will quickly inform him that very, very few boats are equipped to navigate over rocks and hills and such.

In short, you don't have to be a salt-encrusted blue-water sailor to tell at a glance that the chart shows certain areas which cannot be travelled by a boat.

Enter Aeronautical Charts

There are other kinds of charts, basically similar, which offer the airplane driver similar information—they are the charts which tell the pilot of certain aerodynamic operating conditions wherein the aircraft will act up, fling a fit and display its resentment in other unpleasant ways.

Unfortunately, these limitation charts, commonly known as Vg diagrams which appear in pilots' handbooks, are not so easily understood or appreciated. They don't come from the Hydrographic Office, nor does the CAA have other than an academic interest in their preparation. They are developed by the folks who build the various airplanes: their purpose—to show just how you can get the best out of your particular scat-buggy and still be around for any future pay raise.

Thus, the whole purpose of this discussion is to show you how you can remain within the so-called operating envelope by understanding what happens when you stray into any of the forbidden regions.

If you should propose to a pilot that he take a fam hop in a strange area without first looking at the local charts, said pilot would mutter something like: "Ah-hah! Here is a real cube!", a "cube" being translated to mean a "square" in 3-D. To which the indignant pilot might add that he, Buster, wants to *know* where he's going.

OUT OF BOUNDS

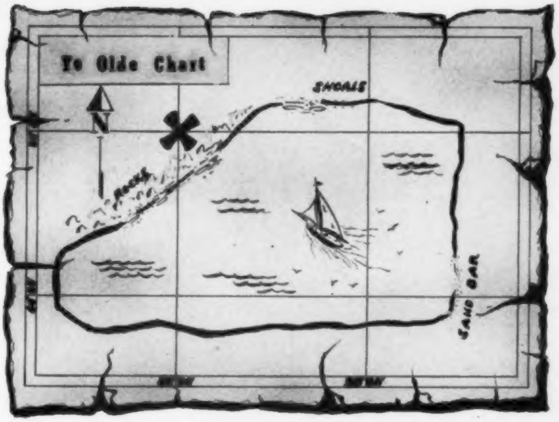


Fig. 1. You can't take a boat into certain geographic areas any more than you can safely fly into certain aerodynamic areas.

Pull up a chair, bub, and dig some of this hot dope about the Vg diagram—frequently called the "envelope," an often-ignored critical area of flight operations.

Yet this very same gent will spur his sweptwinged steed into the blue with only the foggiest notion about the potential dangers of the aerodynamic regions he plans to explore.

It's Called the 'Envelope'

All of this concerns a thing called the "envelope," and if you'll look now at the other chart (*Fig. 2*), we'll see how it works. First off you'll notice it's just like the other chart (*Fig. 1*) in that it has horizontal and vertical values similar to the latitude and longitude marks on the first chart. On the first chart, if you proposed to go to a location that was a combination of the lat. long., you just counted off the squares and there you were—simple.

This operating envelope chart is just as simple.

Instead of latitude you have G-values; instead of longitude you have speed in knots. Notice all around this envelope there are some restricted, off-limits-to-aircraft areas, just as there were rocks and shoals and stuff on the other chart. Rii-ight! You're to stay away from these zones!

A Word to the High Brows

At this point it is well to pause a moment and reassure the gents of the slipstick set who may have begun to rattle their slide rules nervously at this brash treatment of their science. Don't pull our diagram apart in an attempt to

OUT OF BOUNDS—Cont.

apply it to a specific aircraft. It was not designed for NACA or as MIT reference material. The chart is intended to represent a *fictional* aircraft for altitudes up to about 5000 feet.

From sea level to 5000 feet, this is what the general picture is like.

For the 1955 model speedsters which perform at 25,000 feet and above, various other things are encountered, such as onset buffet, tactical buffet, and the like. You will find in your pilots' handbook some envelopes at those altitudes which clearly show that any attempt to over-G the aircraft will result in a stall long before Limit-G is reached.

However, it is the intent of this article that Mister Average Pilot, who may well consider himself something of a rookie in these tricky matters, be shown the facts of life concerning our representative diagram and envelope (sea level to 5000 feet). Thus he'll be better equipped to decipher the intricacies of the diagrams in his pilots' handbook.

As you can see, there are four of these verboten areas on the representative Vg diagram. But we're concerned with areas A, B, and C. Dispensing with the four-dollar phraseology we can describe these areas like so:

Area A

Area A is that region of aircraft operation wherein the airplane *just won't fly* because it's *stalled*. In the particular case of the theoretical plane used in this diagram, the airplane can't begin to fly, that is, support its normal weight of 1G, until it's moving at 100 knots. Then you're in business—except you can go out of business faster than an insurance fire sale if you ask the airplane to give you more than 1G without additional speed. Get it?

Using this chart, imagine that you just whistled into the break at a nice comfortable 200 knots, so you decide you'll bend the old buggy around at about 5G just to brighten up the day for the boys in the tower. Now, before you horse back on the stick, let's go back to the chart. You say to yourself: "I want to go to lat. 5G; long. 200 knots—where does that put me?" So you run your finger up the 200 knot line to the 5G line, and see if you're still in the envelope.

'Yipes, I'm Outside . . .'

"Yipes!" you exclaim, "I'm outside the envelope! Leave me select another latitude of G which will keep me off those aerodynamic rocks, or move to a new longitude of 250 knots."

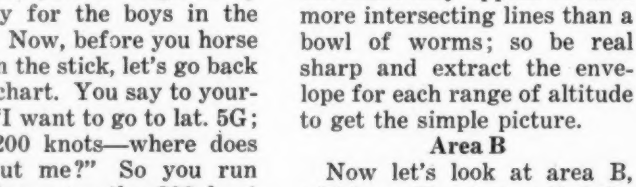
Just a glance assures you that some latitude less than 4G, or some speed in excess of 230 knots will do fine, and you can go your merry way.

Notice that the G values are plus, or positive. There are also negative G forces which are just as uncompromising as their positive counterpart—and the allowable limits are even less. About two negative G is the house limit for most airplanes. Demand more from your sturdy little buggy and, whammy—a brand new way to fold the wings, permanently.

In this chart the values noted are for only one range of altitude; namely, surface to 5000 feet. The picture changes with increments of altitude, and your pilots' handbook will show same. Every pilots' handbook will have such a diagram but sometimes the chart may appear to have more intersecting lines than a bowl of worms; so be real sharp and extract the envelope for each range of altitude to get the simple picture.

Area B

Now let's look at area B, which you'll note is called the *unravel area,* and that's precisely what will happen if you get all wrapped up in a muscle-bound maneuver and overload the airplane's wings—the airplane structure will just plain come apart. Incidentally, most of this unravel trouble occurs at sea level up to around 25,000 feet. Above this altitude, most high-performance aircraft stall out



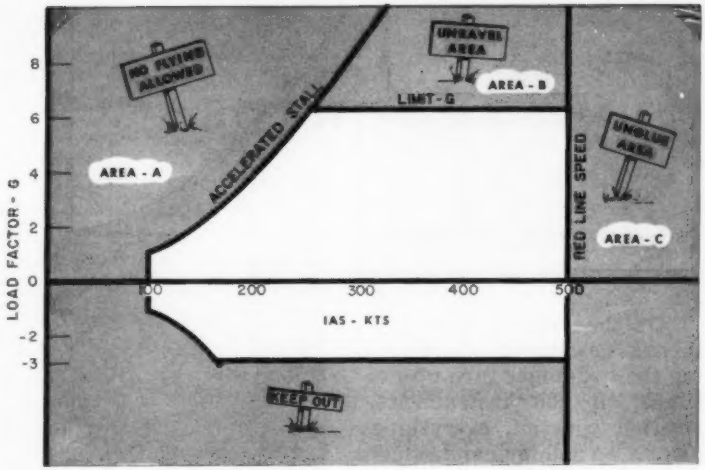


Fig. 2, a chart representing the "envelope" (or V-n, V-g diagram).

before they pull enough G to cause structural failure.

When you barge into this area, it's because you misinterpreted a big fat airspeed reading as a blank check for pulling a large amount of G forces. And it would be, except that the airplane begins to come apart at the seams if you exceed the design strength; the limit G of the airplane structure. The people who built the airplane for you have established very accurately the limit of G forces which can be sustained by the plane.

Sure, you can pull more, and you'll never need to worry about stalling out as shown in area A, but when you cross the limit G line into area B, the general effect will be about the same as parading a democratic election rally into Berlin's Eastern Sector. Things begin to go to pieces fast. At limit G you are in a never-never land where only an accidental bobble of the control stick, or a slight bit of turbulence can bump you into what is known as *ultimate G,* and *that,* colleague, is the absolute end.

AD and T-28 Drivers Please Note

At this point it would be well to caution the pilots of planes like the AD and the T-28 that this area B is much cluttered with the remains of such aircraft. Their troubles are encountered at the pullout point of dive-bombing runs, aggravated at times by a rolling pullout, or when some loyal alumnus tries to fan the picnic fire of his class reunion and winds up in the proverbial messy ball.

The envelope picture, of course, varies with each airplane and with each change in altitude—but the pattern remains the same. Go to your handbook, extract the envelope for several increments of altitude and get the real picture. Then stay within the operating envelope and you'll never lose an argument with G forces.

Next: the Unglue Area

There is a third major area included on the chart in Fig. 2. Call this one the *unglue area* because that's exactly what will happen to your airplane when you inadvertently bore into this region. The next of this "Primer-for-Pilots" series will grapple with the problems encountered in this area of flight operations.

For now, just remember that the troubles you run into in this unglue area are primarily a result of sheer speed and a weird thing called "aeroelastic effect." That is, speeds at which cockeyed things begin happening to your wind machine—with only 1G imposed!

Learn that Redline Speed

So just engrave the manufacturer's redline speed on your grey matter and remember, he ain't kidding when he says that's max, Mac. *He means it.* (There'll be more of this later.)

There you have the aircraft Vg envelope, and the information to be obtained from the Vg diagram in your pilot's handbook. This information is as much a part of your equipment as your parachute.

As a matter of fact, if you use the former, you probably won't have much use for the latter—but if you don't stay in the envelope, chances are you may not be able to use the chute! ●

This is the third in a series of articles discussing critical areas of flight. Previous articles, entitled "Thrust vs RPM," and "G and Thee," appeared in the Naval Aviation Safety Bulletin.

Truth and Consequences

a digest of recent aircraft accidents

VF

F9F

WHILE waiting to be taxied onto the catapult, the operations officer of an F9F squadron was mulling over in his mind what he had said about clearing turns during the preflight briefing. He had been stressing to the pilots the need to "look sharp" around the carrier. He knew one of the marks of a hot fighter squadron had always been the ability to look good around the carrier.

Reflecting on this, the operations officer reminded himself that his own clearing turn after being catapulted would be a smartly executed example to the pilots observing the launch.

"On the catapult now . . . there's the catapult officer giving the two-finger turn up . . . check all the instruments, position yourself, everything okay . . . a snappy hand salute given and then . . . whammo! I'm airborne, airspeed 122 knots and gear is up . . roll into a definite turn to the right, okay now back to the left to parallel the ship's course. . . . Now!, that's the way a clearing turn should look . ." Crash!

In this second turn, the angle of bank steepened, and the angle of attack increased until the aircraft stalled and crashed into the water. The pilot, while attempting to set a good example, had allowed the plane to stall in the turn.

A clearing turn after launch from a carrier deck has always been desirable and considered good technique. However,

THE BEST of intentions boomeranged—

pilots must be reminded frequently that the period immediately after becoming airborne is critical when the airplane has a full load of fuel—particularly if there is armament loading in addition. ●

VA

AD

"The AD contacted the ground in a left wing-down, nose-low attitude. The left wing tip hit first and separated. The left wing continued to dig in until it disintegrated to the area of the wing fold. . . . The engine next was torn from the airplane and rolled another 70 feet." The accident report continued:

"The airplane cartwheeled, driving the starboard wing into the ground and tearing it from the fuselage . . . the fuselage became airborne and continued over the starboard wing, contacting the ground on the port wing stub. . . . Here the empennage was sheared from the fuselage to continue forward another 50 feet . . . the fuselage came to rest inverted 174 feet from the point of initial contact . . . all plexiglass in the canopy was shattered except the bullet-proof portion of wind screen which

was forced out but intact . . . with the pilot partially pinned by the bent windscreen frame.

The pilot said: "I was able to get out, but not without difficulty . . . "

A circling pilot reported: "I searched the area about the crash for a parachute, hoping the pilot had parachuted to safety . . . as it was my belief that no one could have survived the crash . . ." The reviewing medical officer stated: "This is reason to be proud of the prudent use of the conventional safety equipment in the aircraft, without which the pilot would have unquestionably perished."

How did it all happen?

The pilot made a message drop to relay certain information to a strafing target crew. The message drop was made at 90 knots, full flaps, 2400 rpm, 25 inches manifold pressure. Upon releasing the message he went into an easy left bank and added throttle. As he added throttle the left wing went down with an increasing rate of roll. To offset this the pilot retarded throttle, which was effective except that too much altitude had been lost.

The pilot's concluding comment, a classic understatement, was; "I feel this accident would have been avoided if I had been 10 knots faster or if I had been 100 feet higher." ●

TORQUE ROLL following a message drop.

VP

P5M

Recurring instances of seaplane accidents within the operating boundaries of seadromes serve to re-emphasize the continuing need for adequate facilities, standardized, and carefully supervised operating procedures, as well as proper indoctrination and training.

Throughout the history of seaplanes, which dates back to the beginning of naval aviation, the importance of these fundamental elements of patrol flying have been firmly proven. The continuing development of seaplane operations requires even more rigid adherence to these basic factors, and the absence or neglect of any one is promptly reflected in serious accidents.

Several recent seaplane accidents offer proof of the dangers of improper or inadequate procedures and facilities. The following example is cited:

A P5M-1 was cleared on a night navigation and crew training flight. A clearance was obtained for takeoff on the sealane 27. On takeoff the aircraft was observed to begin a left turn from the sealane heading until a SW heading was reached. It appeared to become airborne and turn slightly to the right before striking the 10-foot high seawall in a nose-high, wing level attitude. The four crewmen stationed in the lower hull section were fatally injured. The remaining seven crewmembers received only minor injuries.

Subsequent investigation disclosed that: (*1*) The crash boat was not stationed in the correct location in accordance with local instructions. (*2*) All seadrome lights were not in operation during takeoff. (*3*) The seadrome control tower was not in operation at the time of the accident, and (*4*) Both pilots had inadequate recent night and instrument experience in the last six months in accordance with current OpNav Instructions. (*5*) Seadrome Marker Light Type FMF-6 A6A 1730 A-1 powered by individual batteries is apparently unreliable, requiring frequent inspection and careful maintenance. ●

UNFAMILIARITY WITH control linkage caused this S2F to settle in on takeoff.

VS

S2F

The pilot of an S2F-2 raised his wheels prematurely during takeoff. This action, coupled with the fact that he was unfamiliar with the workings of the elevator downspring mechanism, caused the aircraft to trim itself and settle wheels-up onto the runway. Damages to the airframe *alone* amounted to an estimated $70,000.

The downspring mechanism is a pushrod connection between the tailwheel and the elevator. Its purpose is to counteract the center of gravity shift and trim change when the landing gear is retracted. The landing gear on the S2F retracts to the rear causing a shift in the CG and a nose-up trim. To compensate, the tail bumper wheel, which retracts last, actuates the pushrod which in turn acts on the aft elevator sector. This causes a heavy nose-down pressure on the elevator.

The pilot in this accident reported that he had started a normal takeoff. Shortly after becoming airborne he retracted his landing gear and nosed over to level off and attain a greater speed. Just after the level off the pilot felt that something was pulling the nose over. Before he could correct, he was back on the runway.

Post-accident flight tests on similar aircraft showed that on retraction of the gear, the aircraft nosed up slightly. Then when the tail bumper wheel retracted, the aircraft nosed over. During ground operation on jacks, it was found that the downward pull on the elevator, as the tail bumper wheel retracted, was 15 pounds.

However, if the yoke were allowed to start forward, as in a correction for the initial nose-up trim, a strong pull of 30 pounds was required to reverse this downward movement. The AAR Board concluded that though this item points to design problems all others point toward pilot error.

As a result the board made the following recommendations: (*a.*) All pilots should be reminded frequently that turbulent air, slipstream, the distraction of reaching for the gear lever and dozens of other items may cause a pilot to lose altitude shortly after takeoff. To avoid this danger he must wait until well airborne before retracting the landing gear; (*b.*) Pilots should be especially cautioned not to retract the landing gear while it is possible to make a safe wheels down landing on the runway; (*c.*) All S2F pilots should receive a thorough checkout in the operation of the elevator downspring mechanism. (*d.*) The feasibility of modifying the downspring mechanism be studied. ●

HU

HUP

At dusk two HUPs took off on a night search-and-rescue mission for a TBM which had ditched off the coast. Both pilots were reminded of the importance of maintaining sight contact with each other and of returning to base in the event of unsatisfactory weather conditions. At the time of the briefing the briefing officers were unaware that the two helicopters were equipped with different radios, one VHF and the other UHF. However, this fact was known by both pilots and the tower operators.

The two-plane section proceeded seaward with the lead aircraft at 100 feet and the second helicopter following

3000 yards back at 200 feet. After crossing the beach the second pilot experienced vertigo and turned back. He turned on his landing lights, descended to 100 feet and again attempted to proceed seaward. Crossing the beach the second time, he flew into the fog bank and immediately went on instruments returning to a clear area over the beach.

At this time the section leader was still in sight, about three miles at sea, with landing lights on. A radio message was intercepted by the wingman that rescue of the TBM crew had been effected by submarine. The wingman requested clearance to return to base and suggested the section leader be contacted on VHF.

No radio contact was made with the section leader and search and rescue facilities were alerted utilizing surface craft. The next morning the wreckage of the helicopter was found 12 miles off the beach, its condition indicating violent contact with the water.

The accident board's investigation disclosed that the weather at the time of the accident was: 500 feet overcast, occasional scud at 300 feet, surface visibility seven miles, and a one degree spread. The pilot's experience consisted of 365 helicopter hours with 114 in the HUP, and a total in all models of 1680.

This accident again demonstrates the fact that helicopters are not yet properly instrumented for all-weather flight. Also, the emergency nature of search and rescue missions presents a strong temptation to pilots to overcome the deficiencies of their equipment and their own ability.

Pilots and supervisory personnel should carefully weigh the calculated risks involved in flights of this nature. ●

NAS

SNB

The pilot was returning from an authorized night instrument cross-country training flight in an SNB-5. Home base reported the weather as 300-foot ceiling and 2½ miles visibility with light rain and fog.

On the first approach a waveoff was given at GCA minimums. A 60-70-degree crosswind from the right existed at about 18 knots with gusts to 30 knots. The time to set up GCA on another runway would take about 40 minutes. A second GCA approach was attempted and the pilot broke clear at about 200 feet, holding a 35-degree heading correction.

After touchdown the left landing gear collapsed but the aircraft continued on finally coming to rest off the left side of the runway. Safety equipment operated satisfactorily and no injuries were sustained.

The landing gear collapse was due to overstress by sideward motion and collision with a runway light. The board concluded that: (1) the pilot erred in attempting to land under existing crosswind conditions (2) the pilot did not correct enough for the crosswind and (3) a crosswind landing at night with gusts up to 30 knots and with GCA minimums is a difficult task in an SNB type aircraft.

The pilot had sufficient fuel to proceed to his alternate. Pilots should consider closely all factors that may jeopardize a safe landing and never hesitate to proceed to their alternate when a situation arises that warrants it. ●

GCA RUNWAY at his alternate did not have a strong 70-degree crosswind.

The Tiptank

A round-up of useful information

SEVERAL cases have been reported where the AN/PRC-17 life raft transceiver has gone on a sitdown strike because a bit of water got in the battery compartment when the aircraft sat down in a water ditching. This is an unfortunate situation unless the survivors are eager to prolong their ocean voyage.

Inasmuch as the transceiver is otherwise waterproof, it is believed that water leakage occurs at the bottom plate subsequent to battery installation. This is usually the result of careless assembly of a rather delicate piece of equipment. A heavy hand on a large screwdriver applied to a small brass screw is guaranteed to produce a leak. Careless installation of the watertight gasket will produce the same results.

Above all, exercise extreme caution in assembling the PRC-17 following any maintenance work or battery installation. An improved watertight stowage container is under development.

In the meantime, it is suggested that the Water Storage Bag, Stock No. R83-B-30175 be modified as follows:

(*a*) Remove the vinyl-resin strips from the neck of the bag by cutting as close as possible.

(*b*) Insert the transceiver into the bag.

(*c*) Fold-roll all neck material possible to obtain a watertight seal, and secure strap.

Step b, *is* possible. Try again.

COMPLACENCY—SYMPTOMS AND CURE

For transport commands which may on occasion experience a rather frustrating display of over-complacency on the part of flight crews, the following observation, from the Flight Safety Foundation's *Accident Prevention Bulletin* No. 55-10, may provide a solution.

In its discussion of the problem of complacency, which may be present in the minds of flight or maintenance personnel, APB 55-10 reported cases where the pilot or copilot spent a large part of his flight time while flying on busy airways reading manuals, magazines or newspapers. Other reports were cited of all crewmembers eating at the same time, failure to use checklists and of coffee served in climb.

Noting that the first reaction to this state of affairs is one of frustration, anger and disciplinary measures, the *Bulletin* offers that the problem may result from a deeper source than is first evident. "*Why* are people complacent?" asked the *APB*, and submits that these symptoms might result from a weak educational program, poor morale or inadequate aviation safety programs, not to overlook the basic possibility of inadequate training.

In brief, if the problem exists to *any* degree in your command, perhaps the factor of poor supervision is more to blame than the employee. ●

NON-WETTABLE COATING

Squadrons and other flight activities seeking a non-wettable type of coating for aircraft windshields are advised that such a rain repellent has recently been placed in the supply system.

Available in kit form as Aviation Supply Office Stock No. R83K710075, this material has been service tested extensively and evaluation reports indicate greatly improved visibility under varying rain conditions. A Technical Note on this material has been issued, however, directions for application are included in each kit. ●

Aero-Medical

Most people are inexperienced at having an accident.

Preflight the Passenger Too!

IF YOU should just happen to be around when the first flying saucer lands hereabouts, and if the little green aviator invites you for a spin in his machine, you'd probably be in for a number of surprises.

To be sure, the general environment might have some familiar aspects, but chances are you'd be awfully puzzled by most of the gadgets and procedures and equipment.

Even if you were a hot rock jet pilot you'd very likely be asking yourself and the little green men about "Where do I sit? Do I strap myself in? Is this kettle pressurized? Do I need oxygen, or do you characters breathe chlorophyl? Where's the G-suit, and where's the emergency door in case the 'tilt' light on this tin teacup goes on?"

Of course, if your aquamarine host was a considerate pilot who followed OpMars Instructions, he would brief you on the various gadgets and check you out on the equipment you might use, especially the emergency procedure. OpMars is probably pretty fussy about such things.

Sort of silly, isn't it? But just about exactly the same non-fictitious situation occurs all too often in the saucer-less world of naval aviation when non-flight personnel board planes on their first passenger ride.

Frequently, as you well know, you will have occasion to carry first-flight passengers on your hop, and quite a few of these folks don't know a flap from a framelduz. To some of your riders, oxygen is a kind of tent, and G force refers to the FBI. In other words, the many techniques and procedures which you, the pilot, consider elementary knowledge, may be utterly unintelligible to a boatswain's mate.

How often have you observed this picture: Pilot hurries to his seat, or cockpit, tossing a hasty "All squared away? Know how to work everything?" over his shoulder. And the passenger is left

to fumble in bewiderment over the tangle of chute straps, shoulder harness and safety belt. Emergency procedures? Repeat slowly after me: "The Lord is my Shepherd . . ."

Or do you *always* check your passengers to insure they are familiar with both normal and emergency procedures? Even if they grin manfully that they "don't need it, thanks," while they firmly hook the leg strap to the seat belt, or attempt to plug in their oxygen mask to the G-suit outlet.

On the other hand, maybe you're one of those trusting souls who figure nothing ever happens, or who never read OpNav Instruction 3710.7. (you'd be surprised how many embarassing questions certain board members can ask about *that* directive.)

Something Did Happen Here!

Here's just one example of something that did happen, on a normal flight. It was a routine hop, and a short one—an HO4S helicopter transferring mail and two passengers. They left the carrier, but instead of unloading on the destroyer, the plane and cargo had a collision with the water.

The lack of injury was due only to the promptness of rescue, because the pilot had given no instructions to his passengers. At the time of the crash, one passenger was already in the sling and sitting on the hatchway of the sonar compartment. No one had told him not to leave his assigned seat without orders from the pilot.

The other passenger was riding in the inboard sonar operator's seat and when the helicopter began to sink he escaped through the port emergency hatch. He had not been instructed by the pilot as to the operation of the emergency release, but had noted and read the placard instructions while in flight. No one attempted to salvage or use a life raft, which might have been a fatal error in case of delayed rescue.

It isn't enough for the pilot to ask "Do you all know how to use your chutes and life rafts?" In general only the most learned of us will admit ignorance, as it takes a mighty smart man to say "I don't know." And they are even more hesitant to admit failure to understand your first instructions. *Even a pilot may need some checking, in a different type aircraft.* And although "nothing ever happens," the reassurance of knowing what's what will make a more comfortable trip.

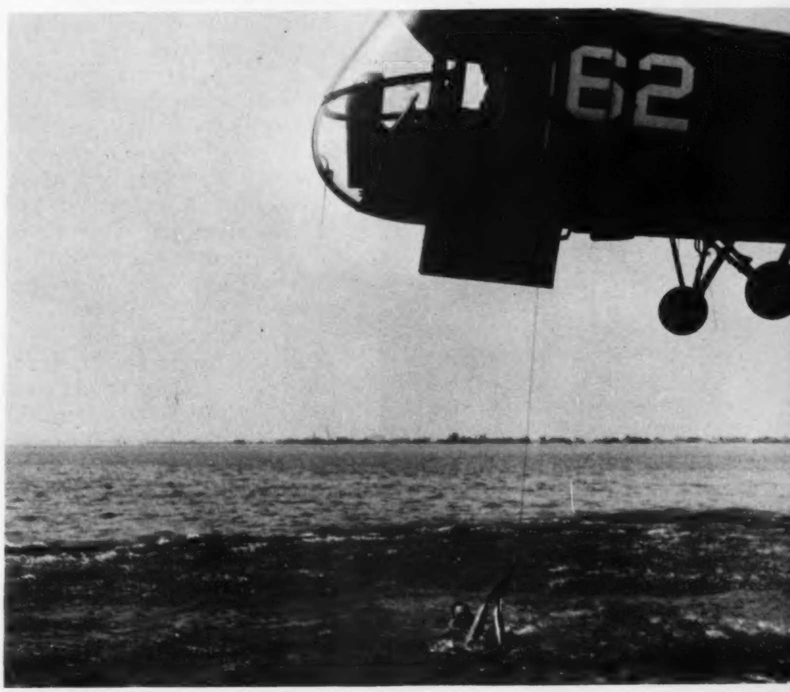
Briefing Check List

So make your explanation clear and thorough, and include what *not* to do where pertinent. Depending on plane type, some of the things which should be included in preflight briefing are:

- What *not* to touch.
- Safety belts and harness.
- Intercom.
- Oxygen equipment.
- Parachutes and life rafts.
- Fire extinguisher location and use.
- Emergency exits and procedures for bailout, ejection and ditching.

Remember, most people are inexperienced in having accidents! ●

He had not been instructed by the pilot on how to operate the emergency release.



That Deceptive Wink

Seeing isn't always believing—check more than the blinker.

THE PILOT had symptoms of anoxia, but 100 percent oxygen gave him no relief. Since his blinker system was operating satisfactorily he concluded that his symptoms were imaginary and continued his instrument work for 25 minutes.

By that time he felt more sluggish, it seemed to be getting dark outside, visual fixation developed and he was unable to read the checkoff list. He pressed the emergency pressure lever and breathed deeply. "Everything got bright and I felt as if I had come out of a dark room into sunlight."

Make this positive preflight check.

Inspection of the mask after landing revealed that a large piece of chalky material was wedged in the exhalation valve leaving it wide open so that cockpit air was entering the system. The slight flow of oxygen through the system had been enough to operate the blinker, but it was too diluted with cockpit air to prevent anoxia.

If this incident had developed into an accident, probably the evidence would have been destroyed—another "fatal-undetermined." However, it could have been prevented entirely by an adequate preflight inspection. This pilot had "checked his oxygen system," but *not thoroughly*.

Many squadrons have an oxygen bottle and regulator in or near the ready room which offers an opportunity for a quick and sure test of the mask. Without such a unit, however, the obstructed valve would *still* have been revealed in the following preflight test.

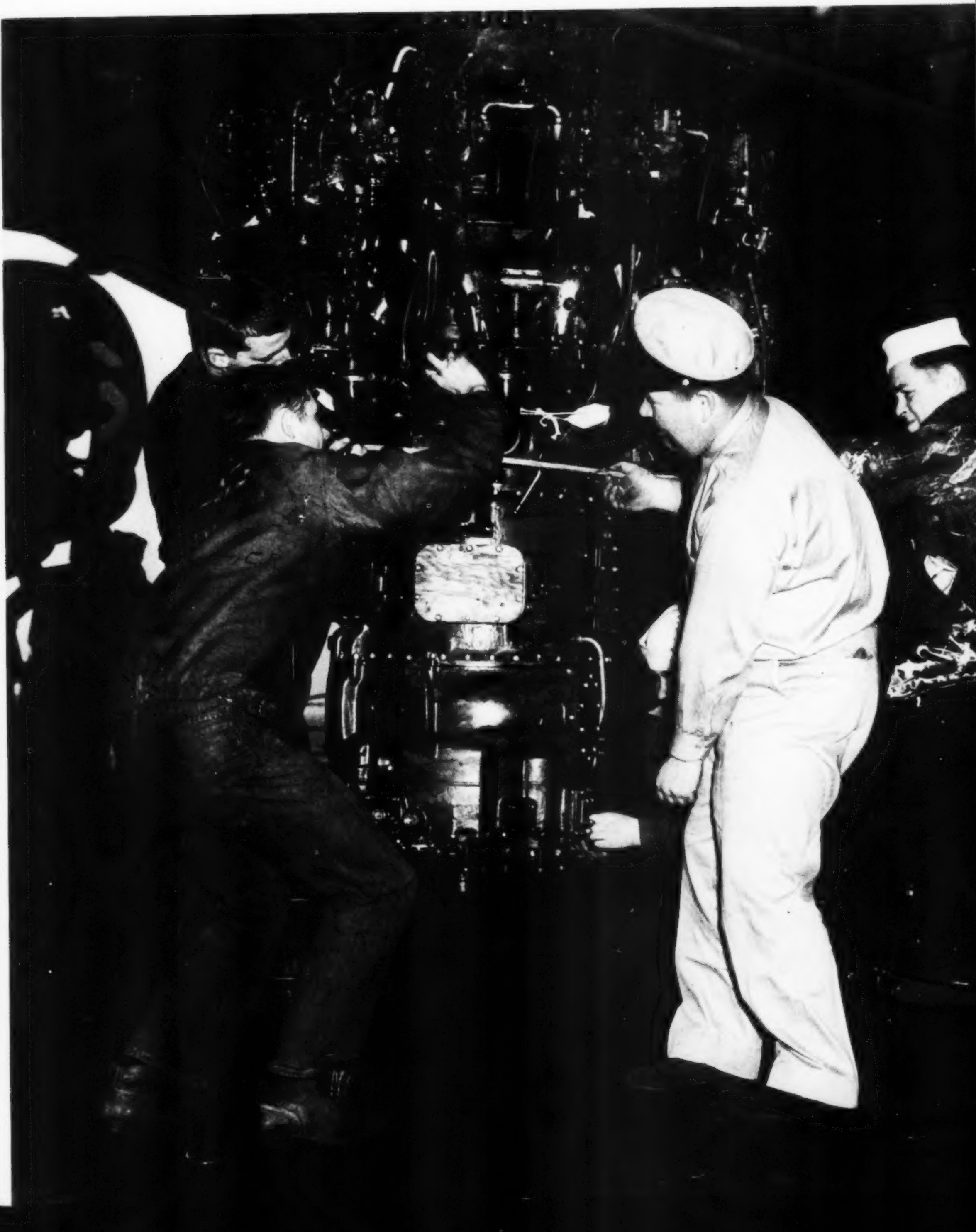
Positive Preflight Test

With mask in place, place the thumb over the quick disconnect fitting and inhale lightly. If there is no leakage a properly fitted mask will adhere tightly to the face due to the suction created.

This test is satisfactory for all types of masks, and will reveal leakage in the mask only. For aircraft system checks see ACSEB 7-55 (Bureau of Aeronautics Clothing and Survival Equipment Bulletin 7-55, formerly T. O. 61-51). It is of vital importance to check carefully all of the components of your oxygen system, in accordance with this bulletin.

Proper care of the oxygen mask includes keeping it clean. Just remove the breathing tube and use soap and water and a test-tube brush to clean the interior, particularly the ducting leading to the inlet valve ports. Instructions are given in ACSEB 27-54 (formerly T. N. 12-50). ●

Maintenance



Foul Play!

Correct diagnosis and treatment of fouled sparkplugs will improve performance, reduce maintenance.

ANYMOUSE Report No. 253 indicated that "many pilots and mechanics" do not know the correct methods of clearing sparkplugs fouled by carbon and lead. Anymouse suggested that a precise description be given of the correct procedures to obtain a satisfactory mag check. Here's a general review of such SOP.

There are many factors which can influence the operation of sparkplugs. Some of these will seem to indicate that the sparkplug is at fault, while actually, the trouble is caused by some other part of the ignition system, engine or by improper maintenance or operating practices.

With such complexities at hand it is impractical to include all the important aspects concerning sparkplug performance in this discussion. Therefore, only the factors concerning carbon fouling and lead fouling will be discussed, which are perhaps, the greatest problems encountered in the field.

CARBON FOULING

The majority of cases of carbon fouling are caused from improperly set idle mixture. Whenever excessive RPM drop is encountered during magneto check the engine should be throttled back to 800 rpm and the mixture control leaned beyond the best power until a drop in RPM of approximately 50 rpm is obtained. The mixture will now be approximately "best economy" and contain sufficient excess oxygen to burn off moderate accumulations of oil and carbon.

One minute of idling at this condition *for each 10 minutes* of normal warmup, idling or taxiing should help to clean plugs for takeoff.

Low Cylinder Head Temperature

Sparkplugs can be fouled during flight by diving or gliding for long periods of time at excessively low manifold pressures. Oil pumped past the piston rings during this time may not burn off the plugs while the engine is cool, and will foul the sparkplugs with carbon and oil. Sparkplugs that are fouled in this manner may usually be cleared by applying throttle *slowly* after the glide.

Prolonged glides or dives conducted at about 15″ MP or above will prevent this type of fouling by burning away the oil as it passes the rings. Carbon fouling in flight can also be caused by a very low power setting with an excessively rich mixture.

The cure is to increase the power setting or adjust mixture manually to obtain peak cylinder head temperature. Avoid excessive leaning where head temperatures are below 175° C or lead-fouling may be encountered.

Oil and Carbon

Sparkplugs may be fouled also during ground running by oil or by carbon resulting from incomplete combustion of gasoline. This type

of fouling can cause engine failures or loss of power at takeoff. When at first the insulator of the sparkplug becomes covered with oil and a soot-like deposit of carbon, the plug will still spark normally at the gap at low, medium, and sometimes high manifold pressures, depending on the degree of fouling.

At high manifold pressures it is easier for part of the spark to go through this carbon and oil than across the electrodes. This carbonizes the oil between the particles of carbon and eventually a continuous carbon track is formed across the insulator such that no spark occurs at the gap. The result during takeoff is almost normal power at the beginning of the takeoff run, followed by sputtering and misfiring *which is so often diagnosed incorrectly as detonation.*

Corrective Action

The corrective pilot action under these circumstances is to cut throttle immediately and stop. If airborne, and impossible to land on the field straight ahead, reduce manifold pressure as much as is possible and yet remain airborne. If the plugs are not fouled too badly the reduced manifold pressure will permit resumption of normal sparking.

Furthermore, if the power is reduced to maximum cruise or lower and a lean mixture is used the restored combustion will soon burn off the carbon deposits permitting subsequent return to high power for climb.

However, following this procedure, *operation at high power* should be thoroughly checked before continuing the flight. If malfunctioning persists a landing should be made and the entire ignition system investigated for cause.

LEAD FOULING

Although the foregoing procedure has been found satisfactory for burning off carbon deposits it is almost impossible to burn off lead deposits from plugs that have become lead-fouled. The best bet then, is to prevent the plugs from becoming lead-fouled.

Researchers have discovered that the whole problem is a function of heat.

A rapid increase of RPM from IDLE to high manifold pressure will cause sparkplug fouling, with resulting engine misfires and power loss. Chemical reaction of the combustion deposits on the ceramic core of the sparkplug is brought about by the very rapid application of heat. It is this rapid temperature change that causes sparkplug lead fouling.

What actually happens is that carbon deposits form on the ceramic nose tip, if the tip temperatures drop below 900 degrees F. These carbon deposits are laid down on top of a lead salt deposit left there from previous operation. Lead salts are the normal combustion residue left on sparkplug tip ceramic during normal operation.

Fouling on Takeoff

When power is sharply increased for takeoff, the rapid heat change across the ceramic tip causes a reaction between the carbon and lead salt deposit with such rapidity that the time element is not sufficient for normal scavenging to take place. The result is a rapid formation of highly conductive molten lead deposit which runs down the nosecore and fuses across the electrode of the sparkplug, *causing a short to ground.* The result is a misfire.

Sometimes this molten deposit will fuse across the electrode of the sparkplug, and completely kill it; however in most cases it just temporarily shorts the gaps and then breaks off (probably from excessive cylinder pressure.) In this case, the engine misfires intermittently causing backfire and power loss during takeoff.

How to Avoid

To combat this lead formation, a slow advance in throttle is recommended to 25" Hg., a pause at this setting for approximately 15-20 seconds until the engine smooths out and then, as smoothly as practicable, an advance in throttle to takeoff power. This procedure, if adhered to by both mechs and pilots, will decrease rapid sparkplug temperature change and the resultant fouling of the sparkplugs. ●

For additional information, readers can consult General Engine Bulletin No. 137, which is the Navy's bible on sparkplug care. Material was also included in the Aviation Safety Bulletin No. 13-54 in an article entitled "Sparkplug Failure." Comprehensive data was also given in The USAF Aircraft Accident and Maintenance Review magazine in articles entitled "Throttle Fiddling Fouls Sparkplugs" and "Care and Handling of Sparkplugs." These appeared in the October '53 and February '54 issues respectively.

Effective operations depend on efficient maintenance

FAULTY FUEL GAGES can be especially serious d... aximum

FROM THE

GROUND U

F2H

The *Banshee* skidded in on its nose. Almost immediately the accident investigation began. What caused the nosewheel to fail to extend?

Scanning the yellow sheet the maintenance officer is literally hit between the eyes with the first clue. Scrawled there among oily fingerprints are the now-famous last words, "Checked OK on the ground." On the second take he notes a squawk written just two days before, "Nose gear failed to retract, but extended satisfactorily."

Sensing he was getting warm he found that over the two-week period just previous (perhaps "too-weak" is more appropriate), there were two more landing gear squawks. Each read, "right main gear failed to extend . . . emergency system actuated". In each instance he found the remedial action signed off, "drop checked satisfactorily."

As a result the accident board concluded:

- That material failure contributed in that the O ring seal in the nose gear cylinder assembly had deteriorated to the point that air pressure was partially lost, thereby preventing the emergency nose gear extension under inflight air load conditions.
- That the right door open limit switch was corroded due to being full of water. The accumulation of water was made possible by a break in the casing of the limit switch. This break probably caused by a previous overtravel of the plunger in the switch housing.
- That under these conditions normal extension of the landing was erratic, as is evidenced by previous write-ups of the landing gear system.

Pilot error was attributed as the primary cause in that the correct procedure for emergency operation of the gear was not used. Even so, the aircraft should not have been in the air until the trouble with the gear had been fixed.

The message contained in "Push That Pencil," page 4, proves more than ever that your safety and that of others rests upon efforts you make to *do things right*. ●

HRS

An HRS-3 received damages amounting to $28,000 as the result of hard landing following fuel exhaustion. The initial cause of this accident was faulty fuel gages.

Maintenance error, the AAR Board concluded, was the most probable cause for the faulty fuel gages, in that the gages were improperly calibrated.

The investigation disclosed that the front tank fuel gage registered 70 pounds of fuel remaining. The actual measurement was one quart or about two pounds. The pilot had selected this tank, believing it to be the fullest. The aft fuel gage registered 40 pounds while the actual measurement was 78 pounds. The 78 pounds of fuel in the aft tank was sufficient for about 20 minutes of flight under normal conditions. The accident occurred only seven minutes from the base at a flight altitude of approximately 500 feet.

It is accepted procedure in transport helicopter operation to operate with reduced fuel loads to increase pay loads for short distances. In view of this fact the AAR Board recommended that maintenance personnel be reminded of the importance of properly calibrating fuel gages. ●

us du[illegible]aximum load, short haul helicopter operations.

Effective operations depend on efficient maintenance

D UP

Notes and Comments on Maintenance

AD

During a recovery from a 50 to 60-degree glide-bombing run, a material failure occurred on an AD-3 which caused the fuel cell, engine and one wing to leave the main structure of the airplane. The plane went into a flat spin and struck the ground in level altitude. The pilot did not survive.

In the opinion of the accident investigation board, a major contributing cause to the pilot's death was the failure of the harness installation which allowed his head to be forced downward upon the control stick. The other injuries listed in the medical report were not considered to have been fatal.

An improper modification (see illustration) of the shoulder harness failed. A clevis pin fitting, attached directly to the seatback armor plate, had been substituted. Where the inertia reel was designated to withstand 40 G, it was determined that the altered installation sheared at 5 G. Post-accident inspection of other aircraft within the squadron revealed a substantial number of similar unauthorized installations. ●

AJ

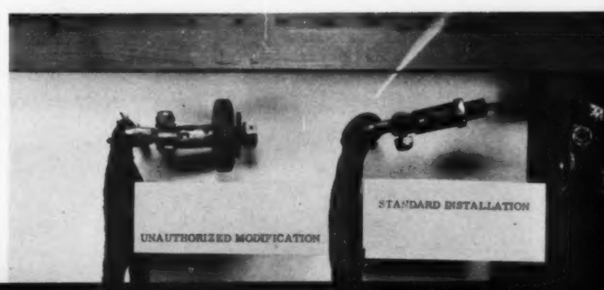
Chafing hydraulic lines resulted in a $4400 loss in damages, to an AJ-2 which was forced to land wheels-up at night.

The pilot noted the failure of the hydraulic system to maintain pressure about two hours after taking off. After applying all known methods of putting the gear down, including the advice of two North American Reps who were called to the tower, he landed the airplane. All hydraulic fluid had been lost.

Primary cause of the accident was the failure of the landing gear emergency system down line. Cause of the failure was chafing of the down line against the rudder boost line. Secondary cause was the utility system hydraulic failure in the cabin compressor unit due to a faulty Garlock seal losing the hydraulic fluid.

No flight crew errors were involved in this accident; however, reviewing authorities expressed views that maintenance personnel might have detected the lack of clearance during check periods had they inspected for such situations.

CHAFING SITUATION caused real trouble for an Able Jig crew.



REEL GONE proved poor substitute for standard installation.

FROM THE GROUND UP, (Continued)

F9F

In two previously reported incidents of inadvertent F9F canopy closings (*Aviation Safety Bulletins* 23-54 and 25-54) the victims were critically or seriously injured. In the third and most recent instance an ordnanceman was killed when he was trapped between the cockpit canopy and the windshield of an F9F–5.

The plane was in the hangar undergoing a 120-hour check. A hydraulic test stand had been connected and two structural mechanics were conducting checks of the landing gear system. The ordnanceman, in the meantime, was in the cockpit installing a new gunsight. It is believed that the ordnanceman inadvertently moved the canopy control handle to CLOSED. The canopy crushed his skull. ●

P2V

Rushing the job was determined to be a major contributory cause of a recent P2V-5 accident in which two turbines disintegrated, followed by fire, during the initial part of an aborted takeoff.

The impeller buckets and the turbine shield assembly disintegrated throwing metal particles through the cowling. The metal particles hit the radome causing considerable damage. Three of the propeller blades were damaged and the fuselage perforated in six places by the shrapnel-like burst.

Investigation by the accident board revealed that the primary cause of the turbine and subsequent engine failure was the omission of the quill shafts. The engine was built up by a Fasron crew which, because of the desire to rush the engine assembly to completion, was augmented by a crew from the squadron which had requested the engine. This undoubtedly accounted for confusion and a hazy delineation of primary responsibility for supervisory inspection. ●

NAS & CV

For ground maintenance personnel who might regard gasoline only from the standpoint of how far it will go, "Accident Prevention Bulletin No. 55-9" of the Flight Safety Foundation poses a very interesting question:

"Do you know that a single gallon of gasoline spilled on a concrete surface will cover from 30 to 40 square feet, and that if a spill of that size is ignited, it's about all a man with a 15-pound CO_2 bottle can control?

"Five gallons of gasoline makes a spill of nearly 130 square feet, and if ignited, two or three men each with a 15-pound CO_2 bottle will have a battle on their hands they won't forget . . . . Don't underestimate the danger of spilled gasoline." ●

O & R

It has been brought to *The Approach's* attention that many Overhaul and Repair Departments are receiving aircraft components for disassembly and inspection wherein the parts to be inspected have been considerably dismantled by squadron mechanics.

In an attempt to find the trouble in a failed component mechanics sometimes tear down the suspected part far beyond their experience and capabilities. When the source of trouble isn't found the component is hastily and incompletely assembled and shipped to O & R for repair or further investigation. In the process, the original difficulty often can never be determined because squadron disassembly destroys the evidence.

If mechanics don't have the test equipment to properly handle a job they should not tamper with it. It's better to send it to O & R intact for proper investigation.

OPNAV Instruction 3750.6A para. 23 and BUAER Instruction 3750.6A set forth the procedures for obtaining Priority Disassembly and Inspection Report. ●

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Carle L. Jackson, ACC(AP) (*c.*)
LCDR William O. Kuencer (*r.*)
Thomas L. Brosseau, AD1 (*l.*)

WELL DONE!

The R4D–8 received IFR clearance and took off from Kodiak with 21 passengers. Ceiling was 300 ft, indefinite, with three miles visibility varying with rain and snow.

At 200 feet and after entering the overcast, the port engine oversped to 3000 rpm. Returning to the field the pilot asked GCA for an immediate approach. Beginning a left turn in accordance with GCA instructions, troubles multiplied as the starboard engine exploded and began to burn.

At an altitude of 500 feet and headed towards known high terrain nearby, the pilot stopped the turn and attempted unsuccessfully to feather the starboard engine. He then directed "gear up, close emergency shut-off valve and dump fire bottle to starboard engine."

Now, low over the water, the pilot turned right, away from known obstacles and began an ADF approach to the field. At this point the airplane had disappeared from GCA scopes. Completing the turn, runway lights became visible and the crippled plane limped toward the runway at 10-15 feet. Approaching the runway, flaps were lowered for a slight ballooning which carried the plane onto the runway for a pilot's choice wheels-up landing.

Touching down at about 88 knots, the plane slid along the snow-covered runway; passengers and crew abandoned the aircraft. There were no injuries. Crash crews immediately blanketed the starboard engine with foam. As a measure of the excellence of the landing, temporary repairs enabled a flyaway to ConUS for permanent repairs.

The pilot on this eventful April 3 flight was Carle L. Jackson, ACC(AP); copilot was LCDR William O. Kuencer and the flight engineer, Thomas L. Brosseau, AD1.

To this team the Naval Aviation Safety Center is pleased to present a "Well Done" for the successful handling of a serious in-flight emergency—the positive approach in action.

Skillful handling of an in-flight emergency prevented a possible catastrophe.

THE SHORT HAPPY LIFE OF FRANCIS MACLOBBER

ADAPTED FROM SOME WORDS OF WISDOM BY THAT FAMOUS AVIATOR: Ernest Hummingbird..